

# Relative Deformations of Superdeformed Bands in <sup>131,132</sup>Ce.

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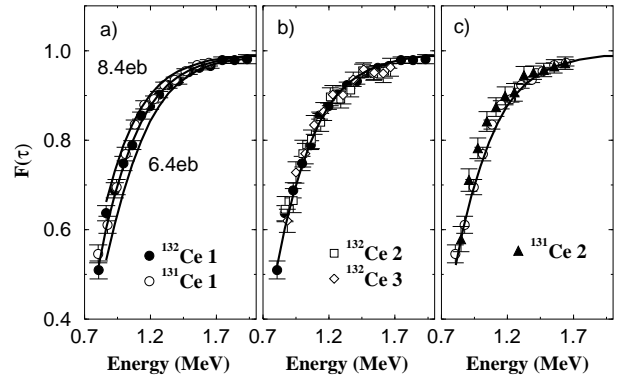
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The quadrupole deformations of states in some SD bands have been determined through lifetime measurements and confirm their SD nature, but very little is known about the relative deformations of yrast and excited SD bands in the same, and neighbouring, nuclei. These differences should reflect the deformation-driving effects of specific configurations and the stability of the second minimum with respect to various nucleon excitations. This information is crucial in providing a stringent test of current theoretical models. With this in mind, superdeformed states in <sup>131,132</sup>Ce were populated via the <sup>100</sup>Mo(<sup>36</sup>S,xn) reactions at a beam energy of 155 MeV. The target comprised a  $\sim 600 \mu\text{g}/\text{cm}^2$  <sup>100</sup>Mo foil evaporated on a  $12 \text{ mg}/\text{cm}^2$  Au backing which slows down and stops the recoiling nuclei. The beam was provided by the 88-Inch Cyclotron at the Lawrence Berkeley National Laboratory, and  $\gamma$  rays were detected by the Gammasphere array which, for this experiment, had 55 large-volume HpGe detectors. A total of  $9 \times 10^8$  events with a fold  $\geq 5$  was collected. A Doppler Shift Attenuation Method (DSAM) centroid shift analysis was then performed.

Experimental fractional Doppler shift,  $F(\tau)$ , curves were extracted and are shown in the figure. Calculated  $F(\tau)$  curves, assuming a rotational cascade with a constant quadrupole moment (6.4, 7.4, and 8.4 eb) and using the stopping powers of Ziegler et al., are shown for comparison with the data. Comparing the curves allowed a number of important conclusions to be drawn. We have extracted the relative deforma-

tions of all five known SD bands in <sup>131,132</sup>Ce to an accuracy of  $\simeq 5\text{--}7\%$ . We find that the yrast bands in these two nuclei have very similar deformations implying that the shape-driving force of the N=6 neutron orbital is less than previously thought. The yrast and excited bands in <sup>132</sup>Ce have very similar deformations indicating that the second minimum is stable to the excitations responsible for these excited bands. The excited band in <sup>131</sup>Ce has a significantly larger deduced  $Q_0$  than any of the other bands. Information on the effect and nature of side-feeding was also extracted and it was found that there is a significant slow side-feeding component for the yrast band in <sup>131</sup>Ce.

Further details of the work can be found in [1]



## References

- [1] R. M. Clark *et al.*, Phys. Rev. Lett. **76** (1996) 3510.